

## Re- and Derailing of an autonomous road-rail shunting vehicle using Computer Vision – Concept design and validation with robotic simulation (Gazebo/ROS)

### Description

The shunting operation in industrial railways or small yards shows great potential for efficiency enhancement through automatization.

In this work, you will design a concept for automated re- and derailing of an autonomous shunting vehicle at designated locations (e.g. level crossing) and validate its functionality with Gazebo simulation. So far, this process is done by manually aligning the vehicle at the center of and parallel to the track and lowering the rail wheels ([https://youtu.be/1\\_xGYNxoCTc?t=9](https://youtu.be/1_xGYNxoCTc?t=9)). For an automated and exact positioning, the vehicle could orientate itself to specific infrastructure elements that are detected by sensors. Processed sensor data continuously feeds the controller to steer the wheels until the desired position is acquired and the rail wheels can be lowered. The generation of virtual sensor data and the concept validation should be done with Gazebo & ROS.

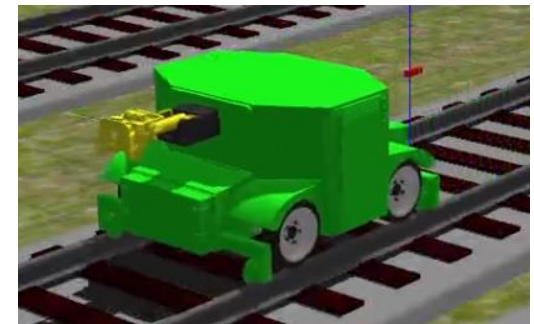
### Work tasks

- Introduction to robotic simulation with Gazebo & ROS
- Design of a concept for automated re- and derailing at designated locations
- Controller design for exact positioning of the shunting vehicle (four single-wheel drive) and implementation as ROS node
- Generation of virtual sensor data and concept validation using Gazebo simulation
- Evaluation and documentation

### Further notes

- Independent and thorough way of workign desired
- Experience in Pyhton or C++ advantegous

If interested, please apply with CV and transcript of records



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